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# SCIENCE NEWS-LETTER

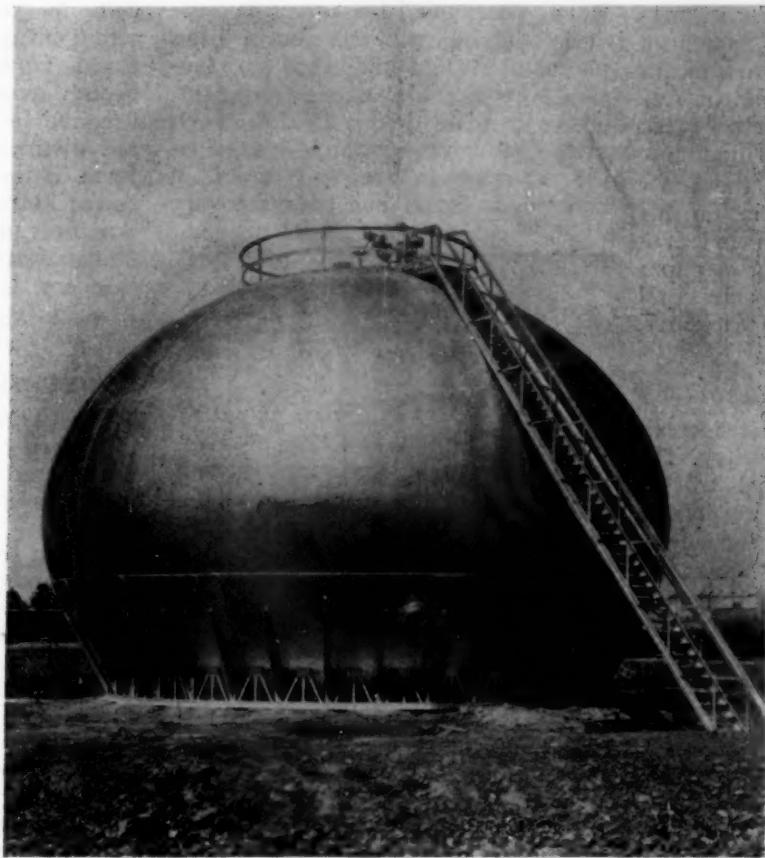
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September 13, 1930



## STEEL BALLOON FULL OF GASOLINE

*Squatty Shape Uses Metal Economically*

(See page 175)

Vol. XVIII

No. 492

# Spain May Yield Aztec Literature

*Archaeology*

## Historians Seek Books Monk Spent Lifetime Compiling

LARGE quantities of Aztec literature, believed to have been lost forever when the Spanish conquerors entered Mexico and destroyed the pagan writings of the Indians, are still in existence. This idea of Prof. John Hubert Cornyn, authority on Aztec language and literature at the National University of Mexico, is based on his studies of Bernardino Sahagun, a sixteenth century Franciscan monk who compiled a most ambitious history of the Mexican people.

Sahagun arrived in Mexico in 1529, eight years after the Spanish conquest, and became a teacher in mission schools which the Spaniards were establishing in order to educate the young Aztecs. Children of Aztec nobility gathered into these schools were eager and brilliant.

Sahagun began to use the most active students to aid him in his researches into Aztec life and customs. For his benefit, these pupils took down from their elders all kinds of stories, poems, legends,

rituals, songs, wise old sayings, and a vast body of other knowledge which had been imparted in Aztec schools. Sahagun also came into continuous contact with Aztec Princes, nobles, priests, and their descendants, and through these he collected and copied documents and other data for his Mexican history which he intended to write.

Twelve books were compiled, and Sahagun sent the vast collection of Aztec documents back to Spain, as his monumental history. Some of these are now in the Library of the Royal Palace and some are in the Royal Academy of History in Madrid. These portions have been photostated and published in facsimile by the Mexican government. There is little doubt, Prof. Cornyn says, that most of Sahagun's valuable manuscripts are still buried in archives in Spain, and their recovery

will add enormously to knowledge of Indian Mexico.

The very nature of the documents disprove Sahagun's own claim that he was the author of these books in Aztec, Prof. Cornyn says. He believes that rather than representing the work of the Spaniard, the history is a real Aztec literary work, for the Indians collected the material and made the pictures that accompany the text, and Sahagun's part fortunately consisted only of arranging, selecting, and editing. The language is often so markedly poetic and unfamiliar that the text is difficult to understand. An air of strangeness runs through the account, from the unusual figures of speech which no Spaniard would use, and from modes of thought that are distinctly Indian. The literary form is in the trochaic meter of Aztec literature. Sahagun's history was first published in a free Spanish translation in 1829, under the title "General History of New Spain."

*Science News-Letter, September 13, 1930*

### The Answer Is In This Issue

#### More Infantile Paralysis

INFANTILE paralysis is increasing throughout the country. The number of cases reported to the U. S. Public Health Service, Washington, D. C., has nearly reached the high figure of the 1928 outbreak. For the week ending August 23, there were 325 cases throughout the entire country, with over 60 cases in California alone. This state has had a high number of cases for several weeks, but the disease has lately spread considerably in eastern and middle western sections. It is probable that the outbreak will last for two or three weeks, but it is not considered alarming, officials stated.

*Public Health*

*Science News-Letter, September 13, 1930*

Why is it likely that *Aztec Literature* will be found in *Spain*? p. 162—Do moving electrons make *Arctic winds* or do Arctic winds cause a flow of *electrons*? p. 163—How plentiful is *helium* now? p. 165—How has a Richmond, Va., college professor made *talking movies* for *class room* use? p. 165—What *U. S. Senator*, formerly a college professor, has made important discoveries in the South American Andes about the *Incas*? p. 166—How much are *parents to blame* for boys and girls leaving home? p. 168—Where do *hurricanes come from*? p. 170—Is it possible for a *male toad* to become a *mother*? p. 173.

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#### Thieving Birds Bribed

FATHERED robbers that have been raiding the Texas State forest nursery and gobbling up pine seedlings have been conquered by kindness. Birds that attacked seedlings last year were not deterred from their careers of crime by either shot-guns or scarecrows, V. V. Bean, superintendent of the nursery, found Whereupon, Mr. Bean cudgeled his brain and hit upon the plan of serving a daily free lunch of oats. The birds responded to the courtesy campaign by leaving the little pines alone.

One bushel of oats has been sufficient to reform—or buy off—the robbers for the entire season, until the seedlings passed the tender age at which they were tempting bird food.

*Ornithology*

*Science News-Letter, September 13, 1930*

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# Strange Radiation of Sun

## Causes Weather and Earthquakes Says New Theory

*Astronomy*

A HIGHLY penetrating radiation of electrons from the sun, guided along the magnetic lines of force of the earth, then entering into the surface of the earth and producing electric currents within, may be the cause of earthquakes, volcanoes and earthly weather conditions. This sensational hypothesis was presented at the recent meeting of the American Astronomical Society in Chicago by Dr. Benjamin Boss, director of the Dudley Observatory, Albany, N. Y.

It is but one manifestation of an electro-magnetic universe, he suggests. He believes the entire cosmos is a huge electromagnetic field. In this are local fields, the island universes, of which our whole milky way system of stars is one. These local fields, in turn, have within them sub-local fields, the stars, and even in the stars are still more localized fields, the atoms.

Einstein's gravitational universe, assumed in his theory of relativity, is therefore really an electromagnetic one, if the views of the Albany astronomer are correct.

Referring to studies made of the electric charge carried by the earth, Dr. Boss pointed out that the charge depends on the position of the sun relative to the magnetic poles. The maximum electric charge on the earth occurs when the sun is on the meridian of the north magnetic pole, which is the positive one, while the minimum charge occurs when the sun is directly above the meridian of the south magnetic pole, the negative one.

### Loss In 10 Minutes

"It was this discovery," declared Dr. Boss, "that led me to trace the complete picture."

Then he pointed out that the charge of the earth would diminish to a tenth of its initial value in ten minutes if there were no source of replenishment. Because of the relation between charge and the position of the sun, it is reasonable to conclude that it comes from this body.

"Thus," he declared, "we are led to the hypothesis that the negative electric charge on the earth is maintained by a penetrating electronic bombardment from the sun, which, on its arrival at the earth, is guided along the magnetic lines of force, thus entering the earth in the magnetic polar regions from whence it is distributed to all the earth."

Some evidence in favor of this radiation, he stated, is given by the aurorae, or northern lights, which follow the lines of magnetic force of the earth, as shown by the Scandinavian physicist, Carl Stormer. This indicates that the radiation causing these lights travels along such a path, and it has also been shown that these rays probably come from the sun.

### Wind and Potential

The best experimental evidence, however, stated Dr. Boss, is that of Dr. Harald U. Sverdrup, who made electrical and magnetic observations on Amundsen's ship, the "Maud," during its long drift in Arctic waters. This confirmed similar observations made in the Antarctic previously by a British expedition. It was that, as the wind increased, a higher electrical potential was observed, and the effect was attributed to drifting snow.

"It appears that the cart was put before the horse, and that it is a higher potential which causes the increased wind velocity," said Dr. Bo-

"In this experiment," he continued, "we have direct evidence that the penetrating radiation causes the winds, for the electrometer jumped forward with every gust of wind. It is explained through the fact that an electron rushing through the atmosphere creates a vacuum along its path. The air rushing in to fill the vacuum tends to follow the direction of the speeding electron. As the radiation is entering the earth via the magnetic polar regions this would explain the high winds encountered near the magnetic poles; and the distribution of the atmospheric charge, taken by the air

from the polar regions and distributed to the rest of the globe, would explain the flow of atmospheric currents from the poles towards the equator.

In this way, the winds of the earth are caused, he thinks, and from this, the weather, for it is the currents of air that carry temperature changes from one part of the earth to another.

Prof. E. W. Brown, of Yale, who presided over the meeting as president of the society, has demonstrated that the earth rotates irregularly, and this has been attributed to a pulsation of the earth. Dr. Boss believes that there is a daily pulsation as well and that this becomes manifest through the distribution of earthquakes. In support of this he has found that the frequency of earthquakes at various times of day, and the daily variation of electricity in the atmosphere show a striking relationship. Most earthquakes occur at the same time as the maximum electric charge.

### Universe of Magnetism

To account for variation in the earth's electric charge, he offered the following speculations:

"Our universe may be represented as a huge electromagnetic field. Through this field cosmic particles are moving which bear electric charges. The distribution of cosmic dust is not uniform and, consequently, regions of different potential will be created. As the sun moves through these regions of different potential its atomic action will be stimulated or will subside. This might easily account for the great climatic changes to which the earth has been subject in past geological history.

According to the supposition advanced, the collection of cosmic particles into dense cosmic clouds, which we call dark nebulae, would bring a great electric charge to these clouds. A star passing through such a cloud would experience an excitation which would convert it into a star of class O or B. Stars of type O and B are bluish in color and very massive. The stars definitely associated with the bright nebulae, which are merely dark nebulae rendered light by the presence of the star, are actually observed to be O and B type stars. It is extremely significant that these stars are confined to the narrow belt defined by the nebulous matter, or cosmic clouds."

In concluding his paper Dr. Boss suggested two direct proofs of his hypothesis. In the eclipse photographs taken to determine the shift of

star light as it passes the sun, predicted by Einstein, it should be found that the shift varies depending on the sun's magnetism. Then the shift of spectral lines in the red, also predicted by Einstein's theory, and found by Dr. Charles E. St. John at the Mt. Wilson Observatory, should also prove to be related to the sun's magnetic field.

"Should the observational data fit my speculation," he concluded, "it would support the idea that the Einstein field is an electromagnetic field."

#### Long Range Weather Forecasting

Discovery by Dr. C. G. Abbot, secretary of the Smithsonian Institution, that there is a close correspondence between changes in the sun's radiation and in temperature at Washington, D. C., "seems to offer promise for weather forecasting nearly a week in advance." At the meeting of the Astronomical Society Dr. Abbot made the first announcement of these new results which are based on studies extending over a period of more than 30 years.

Regular observations of the sun's radiation are made from a station at Mount Montezuma, Chile, a mountain 9,000 feet high in the Atacama desert, and these show that the sun does not always radiate the same amount of heat. Instead, it varies from day to day, even after allowances are made for the effect of the earth's atmosphere. In a study of these variations since January, 1924, Dr. Abbot has found 98 cases of rapid increase of the radiation of heat and 91 of decrease, in each case the change taking about four or five days.

Dr. Abbot has studied the temperature variations at Washington at the times of each of these increases and decreases. Taking the temperature just before the beginning of the solar change as normal, he finds that as the solar radiation varies, the temperature also changes, and that the change in temperature continues until at least four days after the maximum or minimum of radiation. A change in the radiation of eight-tenths of a per cent. is accompanied by a temperature change of about five degrees. At times when increase of radiation is accompanied by an increase in temperature, a decrease of radiation is generally accompanied by a decrease in temperature. This is taken by Dr. Abbot as rather conclusive proof that the changes are not mere coincidences.

A curious feature of the results is that an increase of radiation is not always accompanied by an increase in

temperature, or vice versa. From mid-November to March, and also in May, increase in temperature and radiation ordinarily go together, while in April and from June to mid-November, the temperature goes down when the radiation goes up. This leads Dr. Abbot to believe that the effect of the sun's heat is not a direct one on the earth, but that there is some intermediate atmospheric effect not yet understood. Even in March and other months when temperature and radiation follow each other most closely, there are isolated occasions when the reverse happens. These, Dr. Abbot thinks, are the chief difficulties in the way of weather prediction from solar radiation. But he explains them as being "doubtless caused frequently by one solar change treading too quickly on the heels of another. Again, they may sometimes be caused by delayed receipt from distant centers of action of waves of temperature effect arising from former solar changes."

#### Difference of Location

The changes in temperature are not the same for different places. Though his most detailed studies are for Washington temperatures, Dr. Abbot has also studied the effects in Yuma, Arizona, and Williston, N. D. He finds that there the magnitudes and tendencies of the effects are much the same as at Washington, though the months during which there is a direct change and those during which it is reversed are different.

"My results thus far are tentative," he concluded his paper. "I propose to study barometric pressures as well as temperatures, and to extend the investigation to other parts of the United States and of the world. I have made preliminary studies, too, of 10-day mean values of solar radiation and temperature, and hope that in this way if reliable weather forecasting data are really secured they may be extended to months and seasons in advance."

#### "Other Side of Nowhere"

Why do some stars seem "the other side of nowhere?" Or, as the astronomers express it, why do stars have negative parallaxes? At the meeting of the American Astronomical Society in Chicago at the Adler Planetarium and Astronomical Museum, Dr. Oliver J. Lee, of the Dearborn Observatory at Northwestern University, discussed some reasons for this paradoxical effect.

Astronomers measure the distance of nearer stars by determining their parallax. This is the amount that a star seems to shift in the sky as observed at times six months apart. During this time the earth makes half of a revolution in its orbit, and in June, for instance, is about 186 million miles away from its position in December. By making photographs through large telescopes at these times, and measuring the position of a star as compared with other stars on the same plate but at such great distances that they show no appreciable displacement, the parallax can be measured, and the star's distance determined.

#### The Causes

The farther away a star is, the smaller the parallax, so that a star at infinite distance should have a parallax of zero. However, despite the most careful work of astronomers, some stars do actually come out with negative parallaxes, that is, less than zero. It has been facetiously suggested that they are "the other side of nowhere."

Dr. Lee called attention to three reasons why they should occur. In the first place, he said, it may be a matter of chance. Parallaxes are always very small quantities, and like any measurement are subject to a certain possible error, which may be in one direction or the other. If the possible error is larger than the quantity measured, it may throw the value determined under zero. Another reason is that double stars, consisting of two separate bodies, might act differently at different times in building up the image. Under certain atmospheric conditions the image might be principally of one, while other plates might show mainly the other star, thus introducing a shift not due to the earth's revolution.

The third cause suggested by Dr. Lee is that the comparison stars, presumed to be much farther than the star under measurement, are really nearer, and that under such circumstances, the measure would be a positive parallax of the comparison stars. He urged a study of negative parallaxes with a view to learning more about the distance of the stars with which they were compared.

*Science News-Letter, September 13, 1930*

A mining company in Idaho is giving its miners brief violet-ray treatments daily to make up for their lack of sunshine.

# Enough Helium Now For Many Uses

*Chemistry*

## Abrasive Glass Blackboards Also Described Before Chemists

**H**ELIUM, first discovered in the sun and later obtained at great expense in minute laboratory quantities, is now familiar to everyone as the lifting gas for American airships. Soon, however, it may be even more common for still other uses are rapidly being found for it. At the meeting of the American Chemical Society in Cincinnati this week, R. R. Bottoms and W. E. Snyder, of the Helium Co., Louisville, Ky., stated that "helium gas is now available in commercial quantities in the United States and there is sufficient supply to meet not only the needs of aeronautics, but for other uses as well."

The points that make helium valuable, they stated, are that it is inert chemically, not combining with any other element; it is very light; it is insoluble, conducts heat well and can be cooled to an extremely low temperature without liquefying. These properties, they say, make it valuable for use in metallurgy, for the preservation of food, for heating and cooling and as a circulating medium, instead of air, in drying systems. They also suggest that it can be used as an artificial atmosphere for deep sea divers and caisson workers and for the treatment of diseases of the lungs and blood. In such uses it would be employed as a substitute for ordinary air, the helium being mixed with oxygen, and thus taking the place of the nitrogen in the atmosphere.

### Abrasive Glass for Blackboards

When Little Johnny and Mary go to school within a few years, he or they may write their lessons on blackboards of glass instead of the slate their parents used. Foster Dee Snell, consulting chemist of Brooklyn, N. Y., and Miss Beatrice S. Fox, who is associated with him, told the Society of a method of making glass blackboards that overcomes previous objections to this material.

In making the glass, about 25 per cent. of black chromite, a mineral consisting of oxides of iron and chromium, is added to the raw materials. This makes a glass that is sufficiently abrasive to rub off enough of the chalk to permit writing on it. Ordinary ground glass does not do, because it wears smooth in time. They declared that artificial rubbing tests

of the new glass, equivalent to 125 years of use, produced no appreciable damage to the writing surface. Even slate, they say, requires occasional refinishing.

"The new product," they conclude, "is not a 'substitute' in the usual sense of the term, but a material to replace slate which is equal in quality in every way and superior in many."

### More Dry Ice Than Gas

More solid carbon dioxide, commonly known as "dry ice" is now used than the liquid form of gas, in which it was formerly marketed. D. H. Killefer, chemist of the Dry Ice Equipment Corp., New York City, told members of the American Chemical Society at a meeting in Cincinnati that nearly thirty thousand tons of this former laboratory curiosity will be used during 1930. This is greater than the total amount of liquid carbon dioxide used in 1927, the latest year for which figures are available. It is used for refrigeration, because of its advantages over ice in being colder and in not melting, but changing directly from the solid form into the gas.

### Testing Cleaning Fluids

Dry cleaning fluid, to work properly, should be clear enough to read ordinary newsprint through 11½ inches of it; should have a sweet odor; should be light in color and free from moisture, fatty acids and alkali. These are some of a series of 11 tests for the use of dry cleaners to determine when their cleaning fluid is exhausted. At the meeting of the American Chemical Society in Cincinnati Ralph A. Morgen and Frank Fair described these tests. In order to give satisfactory results, they stated, it is not necessary that the fluid be maintained at the same specifications as the original, but it should be maintained at a sufficiently high quality to give good cleaning.

### Home-Made Talkies

Home-made talking movies, made at a cost of \$12 as compared with a figure many times as much for the professional article, are being employed at the Medical College of Virginia, Richmond, Dr. Sidney S. Negus, professor of chemistry there,

said. A 16 mm. home motion picture camera is used, he said, to photograph the instructor writing chemical formulae on the blackboard.

Then the pictures are subsequently run, and as they are run he talks into a microphone connected with a simple recording apparatus that makes a record on an aluminum disc. When the movies are shown to the students, and at the same time the record is played on a phonograph, an effect of partial synchronization is obtained.

### Fertilizing Florida

With an average of 798 pounds of fertilizer used on every acre of crop land during 1929, Florida leads the United States in the use of fertilizer, R. O. E. Davis, research chemist of the U. S. Bureau of Chemistry and Soils, told members of the Society.

Next to Florida is New Jersey with 417 pounds per acre. On the whole, the states of the Atlantic seaboard use it much more extensively than those inland, though a great increase in its use has come since 1913 in the Pacific Coast states, and there is also a tendency to increased use in the West North Central states. Cotton uses on an average 108 pounds per acre, though 31 per cent. of all the fertilizer used is on this crop. On citrus fruits the rate is 1163 pounds.

Five principal crops consume about 82 per cent. of the fertilizer, though less than 25 per cent. of the acreage devoted to them is fertilized.

*Science News-Letter, September 18, 1930*

### Parks for Spain

**S**PAIN has become a recruit to the ranks of nations developing national park systems, an idea which was initiated in the New World with the founding of Yellowstone National Park in 1872. Spain now has two national parks and three areas designated as "reserves of national interest."

One of the parks is in northern Spain, and the other in the northeast, deep in the Pyrenees. Both are in exceedingly rugged territory, where there are still many wild animals—chamoix, bear, wild boar, deer, etc.

#### *Parks*

*Science News-Letter, September 6, 1930*

# What a U.S. Senator Has Found ABOUT The Rise and Fall OF A Great People

By EMILY C. DAVIS

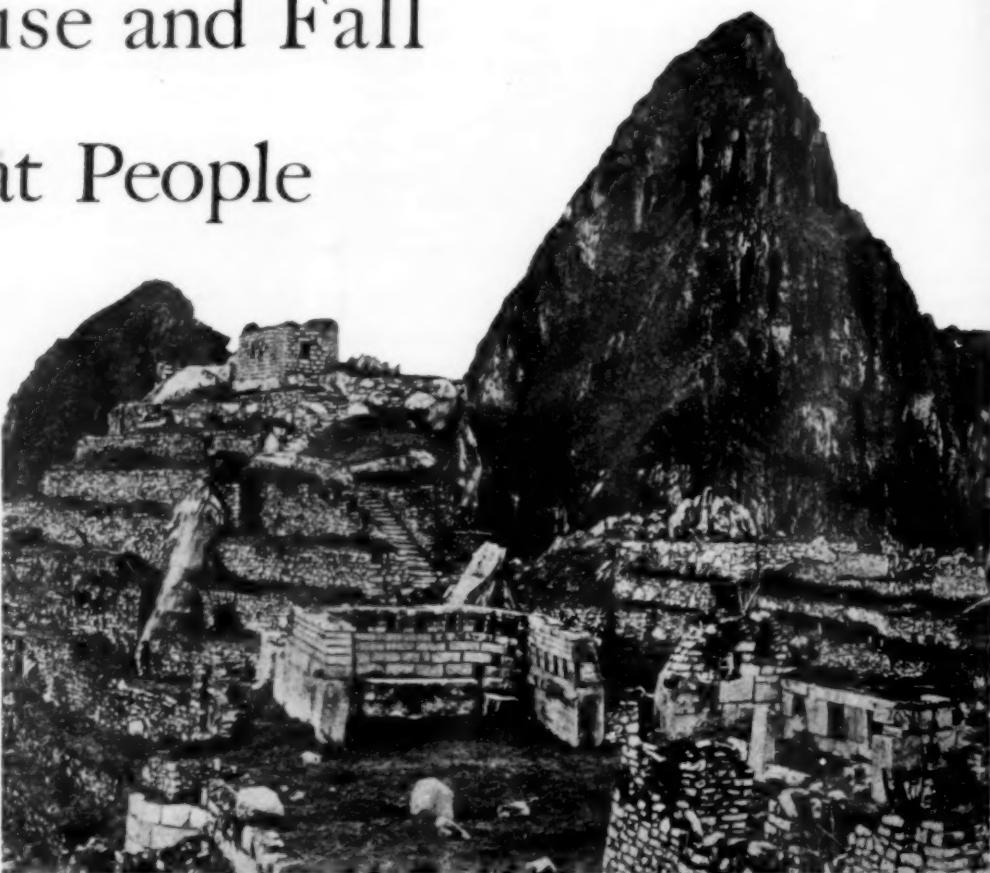
**A**N attempt to dispel the mysterious haze which surrounds the birth and death of the great empire of the Incas in Peru is being made by Dr. Hiram Bingham, formerly a Yale professor, now senator from Connecticut.

It is fifteen years since the senator led expeditions through dense Peruvian jungle forest and up perilous trails of the Andes to the " " of Machu Picchu. But he has never got over the fascination of that career as explorer and archaeologist. Discoveries made by those expeditions have been studied and re-studied in the light of old chronicles.

He has now published a new, comprehensive work which includes a double-barreled theory that Machu Picchu was not only the cradle-city of the Incan empire, but the place where the last of the Incas established a sacred city and sent the last Virgins of the Sun to keep up the religious duties of his dying empire.

### The Family Ambition

White men, from the Spanish conquerors of Peru down to today, have always been eager to identify the places where dramatic events in Incan history occurred. They have listened curiously to the old traditions telling that the rule of the Incas began when out of some place in Peru remarkable for having three windows there stepped a family of Indians. This family had the ambition to make the Sun god the deity of the Indian world and it had a gift for both conquest and political organization. Starting on its Alexander-the-Great career about the



First and Last City of the Incas, Senator Bingham believes. Machu Picchu, high in the Peruvian Andes, sent forth a strong race to conquer and 500 years later sheltered its remnants from the invading Spaniards.

twelfth century, the group of four brothers and one sister founded the line of Incas, or lords. One of the number became the chief ruler, the Inca.

The place of the three windows naturally became a shrine in Incan history, a shrine that some people have thought legendary, though explorers have hoped to find some basis for the story at whatever place the Incas did start on their conquest.

The career of the Incas lasted gloriously for about five hundred years. They brought tribe after tribe into a great communistic government and built up one of the most machine-like and glittering empires that the world has ever heard of. (Fascist Italy bears some resemblance to that highly organized Indian government.) And then—the Spaniard Pizarro came sailing to America in quest of gold and adventure.

In the confusion that followed, in

the midst of Spanish demands for wealth, the Incas stole away their greatest treasure—not the gold that they used so lavishly to make their temples shine like the glory of the sun, but the Virgins of the Sun, the living Vestals of the Temple. Some of these Incan maidens of the nobility were spirited off to some safe retreat, and there, it is supposed, they lived out their days carrying on their religious duties in the last undisturbed City of the Sun.

### Dr. Bingham's Discoveries

Identifying either the place of the three windows or the last refuge of the Incas has proved difficult, because the first writers of Incan history, whether Spaniards or Indians of Incan descent, contradicted one another freely and often let their imaginations and their enthusiasms run away with their pens.

Dr. Bingham's first South Ameri-

can expedition, sent out by Yale, led him to the "most inaccessible spot in the central Andes." Putting faith in an Indian guide who promised to show the explorers the ruined city, Dr. Bingham was rewarded by the discovery of the cloudland citadel of Machu Picchu. He returned twice, directing joint expeditions of Yale and the National Geographic Society. These workers reclaimed from the wild tangle of weeds and trees the plan of the mountain top city, with its granite temples and palaces, its stairway streets, the guardian walls, and its terraced farms down the mountain side.

Dr. Bingham writes: "We uncovered more than a hundred stairways whose existence had not been suspected. We made tentative excavations in various parts of the city. Wherever these test holes yielded results we continued the excavations until nothing more could be found. We searched every nook and cranny of the ridge and near-by mountains for burial caves. Every potsherd which by its shape or its decoration could tell a story, and hundreds more which were eventually used in restoring long-lost forms were collected and studied."

In their wanderings over the city, the explorers were particularly excited by the discovery of a temple with three windows. So familiar an architectural device as a row of windows might not seem like a significant clue to the identity of an historic site, but it could be so in Peru. Prehistoric architects who built the massive stone palaces and temples of Peruvian cities allowed but sparingly for window holes, for the highland climate was severe.

The Temple of the Three Windows, as the stone wall with its big openings was promptly named, was clearly a significant structure. Was it the shrine of Incan origin?

#### Best Temple of Three Windows

Checking over old chronicles, Dr. Bingham found that this temple of three windows bears out the story written by an Indian who was a descendant of a long line of Incas. This Indian with the musical name of Pachacutiymqui Salcamayhua declared that when the first Inca came away from his native home and established himself in the city of Cuzco, he "ordered works to be executed at the place of his birth, consisting of a masonry wall with three windows, which were emblems of the house of his fathers whence he descended."

The temple at Machu Picchu is the

only one in Peru with three large windows befitting a memorial of this peculiar type, Dr. Bingham pointed out. Seeking to know whether the Incas did not throw offerings through the ceremonial windows, the explorers looked in the ground below and found pieces of thirty-one pottery jars.

"There is no question in my mind, therefore," Dr. Bingham sums up the evidence of the site, "that the Temple of the Three Windows, which has

Picchu, we can readily understand why they left the place abandoned and forgotten while they were able to dominate their neighbors. They continued to venerate the place of the three windows in memory, its location forgotten perhaps by all except a few priests or officials, until, at length, the Spaniards recalled it to those who knew the secret location and thought of it as the safest conceivable place for a retreat.

#### Their Supreme Sun God

The greatest anxiety of the Incas in that time must have been to save the Virgins of the Sun, Dr. Bingham states. The Sun worship was a vital spot in their government. In fact, it has been said that the motive power back of the Incan conquests was the desire to make their own tribal Sun god supreme. The prestige and holiness of the Inca was insured by his claim to be the earthly representative of that powerful Sun god who guided Incan destinies. Hence, if the Sun's favored attendants were overthrown, the empire's defeat would be complete indeed.

Some of the temple maidens did escape. These were accompanied by the young Inca, Manco, who had been set up by Pizzaro as a dummy ruler, but who rebelled and fled into inaccessible gorges and canyons, Dr. Bingham states.

This last of the Incan chiefs established his capital at the fortress of Uiticos, near the highway linking Lima and Cuzco. Here he could conveniently attack the Spaniards as they journeyed between the cities. Machu Picchu would not have been so convenient for the Inca's last desperate efforts at fighting for his kingdom.

"It is possible, however," Dr. Bingham adds, "that he placed most of the Virgins of the Sun in the ancient citadel of his ancestors, at Machu Picchu. It will be remembered that Father Calancha relates the trials of the first two missionaries in this region, who, at the peril of their lives, entered the sequestered valley of Uiticos, and later urged the Inca to let them visit the largest city in the region, where was the 'university of idolatry.'"

#### Missionary Did Not See City

The Spanish missionary did not, it appears, attain his desire to visit the university of idolatry, as he called the headquarters of the sun worship. So, he never tested the truth of the rumors that the place was inhabited by "teachers who (Turn to page 174)



Hiram Bingham

**U. S. Senator from Connecticut and formerly of Yale University, who has made three trips to the ancient Inca city of Machu Picchu, high in the Peruvian Andes.**

been described as the most interesting structure within the citadel, is the building mentioned in the chronicle written by Pachacutiymqui Salcamayhua in 1620."

The high and hidden location of Machu Picchu fits in well with old bits of description telling that the original home of the Incas was a mountain refuge, undisturbed by earthquakes. The story which Dr. Bingham reads in the buildings, graves and bits of bronze, bone, and clay pottery found in the ruins is that the mountain citadel had two distinct periods of occupation.

The stone buildings represent two distinct styles of workmanship, the older part being far finer than the masonry added in the Incan style. The older part is thus assigned to the days of the first Incan conquest, and to the centuries just prior to that conquest when some Peruvian tribe took refuge in this mountain fastness.

If the Incas sallied forth to power from so remote a citadel as Machu

## Quack Character Tests

**C**HARACTER analysts who measure the skull by one of the latest systems of phrenology and who interpret their measurements to show the skull owner's special abilities have been tested and found wanting.

A report of the test, in Personnel Research, indicates that any one who would like his abilities sized up might almost as well draw colored marbles, representing different degrees of ability, out of a box and set down his ability on each trait according to the marbles drawn in the lottery. This marble test was actually used by Adelbert Ford, of the University of Michigan, to determine how the character reading system in question compared with pure chance in its success at "hitting the nail on the head." The system proved a negligible shade more accurate than random chance.

"The prevalence of large numbers of individuals and organizations aiming to sell systems of character analysis to employment departments justifies an occasional check of the value of such enterprises, and repeated warning to the psychologically untrained that these activities illustrate good salesmanship but poor science," Mr. Ford states.

### Psychology

*Science News-Letter, September 18, 1930*

## Parents to Blame

**W**HY boys and girls leave home to spend their playtime somewhere else is told plainly in a straw vote taken among 10,000 Massachusetts girls and boys in their early teens.

Among other questions the children were asked, "Where do you prefer to spend your play time: near or in your home, or away from home?—Why?" Less than half of the boys, 47 per cent to be exact, preferred home. Sixty per cent of the girls voted home more fun for leisure time.

Faults in the home itself are responsible for the majority of its failures to hold children, a statement to the American Home Economics Association concludes. The investigation was made under the auspices of the Massachusetts Department of Correction, to obtain information linking with the idea that lack of parental hold on children plays a part in juvenile delinquency.

The children set very high the importance of home companionship with parents, brothers, sisters, and friends. Lack of friends was a frequent cause of disliking home and, on the other hand, permission to entertain friends was frequently mentioned as a cause for liking to stay home. Good equipment for play proved important to the boys, whereas freedom to do as one pleases meant more to the girls. Parental restraint which the boys and girls thought too strict led 16 per cent of the boys and 14 per cent of the girls to find amusement elsewhere. Dullness at home was another conspicuous criticism.

A small percentage of the children evaded home because of chores and errands, but a much larger percentage liked home for the interesting things they found to do there and indicated that household tasks are attractive if presented so.

### Sociology

*Science News-Letter, September 18, 1930*

## Ancient Forest Fires

**E**VEN before the white man came, with his saws and his fires, the primeval forest of the Northwest seldom reached its full development, said Director Thornton T. Munger of the Pacific Northwest Forest Experiment Station at the meeting of the American Association for the Advancement of Science at Eugene, Ore.

Forest fires started by lightning and by Indians swept the woods frequently, and the trees would have to start all over again. The result was that the forest consisted to a very considerable extent of Douglas fir, whereas the "climax," or most completely developed forest type possible in the region, is represented by a mixture of western hemlock, western red cedar and balsam fir.

But with the coming of white men, lumbering operations have set the forest type back from a half-grown forest to none at all. It is the practice in northwestern lumbering to cut clean and burn the discarded tops and branches. These fires leave no living seed in the ground. "Seed trees" left standing help a great deal toward the regeneration of the forest, but the cones are produced in abundance only once in three to five years, and in lean years birds, insects and rodents get most of the seed. Hence Mr. Munger called for revision of methods of logging that will give the forest a better chance to come back.

### Forestry

*Science News-Letter, September 18, 1930*

## IN VARIOUS C

### Your Smoking Chimney

**C**ONVICTION that one's own chimney smokes as much as the other fellow's would very nearly put an end to the smoke nuisance, Victor J. Azbe of the Citizens' Smoke Abatement League of St. Louis believes. And he has convinced many of his neighbors by showing them successive pictures of their smoking chimneys taken at the rate of one a minute.

Mr. Azbe uses an automatic camera to take a picture every minute for several hours of smoke belching from stacks belonging to the reluctant, he has reported to the American Society of Mechanical Engineers. A strip of these movie-size pictures sent the owner usually attracts a surprising amount of attention because the method is novel and leaves little ground for argument.

Such statements as: "We shall stop the smoke, but please don't take any more pictures" are becoming common results of this work of the St. Louis Smoke Abatement League.

### Engineering

*Science News-Letter, September 18, 1930*

## Healthier Babies

**T**HE death rate of babies during the first year of life has decreased considerably in this country during the last fifteen years. At present the rate is 67 per 1,000 births. This does not yet equal the very low rate of New Zealand which has for years held the record in the matter of a low infant death rate. There the present rate is 36 per 1,000.

"This means that only three and one-half per cent. of all the children born die before the year is out," a report by the Metropolitan Life Insurance Company explains. "In our own country the figure is nearer 7 per cent. but this represents the very remarkable gain of 33 per cent. since 1915 when the Birth Registration Area was established and infant mortality figures became available for large parts of the United States."

Our present rate compares favorably with those of most other advanced countries.

### Public Health

*Science News-Letter, September 18, 1930*

# SCIENCE FIELDS

## *Wisdom of Woodpeckers*

CALIFORNIA woodpeckers know enough to get in and out of the wet. In a study of a woodpecker community at Grass Valley, up in the foothills near Berkeley, Calif., Dr. Wm. E. Ritter of the University of California found that the birds usually chisel out their nests on the north sides of the telephone poles they choose for habitations. They apparently prefer the poles to the natural trees when the former are available. Dr. Ritter's study is discussed in the current issue of the *Scientific Monthly*.

Why 92 out of a total of 131 holes counted should be on the north sides of the poles is understandable when we learn that the bulk of bad weather in California blows from the south. The woodpeckers have somehow learned this and cut their front doors accordingly.

But though they are canny in arranging their homes, the California woodpeckers are not always wise in their food-storing habits, Dr. Ritter finds. They lay by great quantities of acorns, hammering them firmly into holes which they bore, or into natural cracks and crevices in the bark of trees. But when they store acorns in the cracks of telephone poles they hammer them in just as firmly, during the dry season when the cracks are at their widest. Then come the rains, and both wood and acorns swell, until not even a strong hand with a corkscrew could get them out. The savings of the poor woodpeckers, due to their owners' lack of foresight, have become "frozen assets."

### *Ornithology*

*Science News-Letter, September 18, 1930*

## *Ages of Love*

THE DISTINCTION between sexuality and erotics, which denotes only the mental complex in sexual relations, was emphasized by the Finnish physician, Dr. Carl Bruhn of Aggleby University, at the Second International Congress for Sex Research held in London.

Erotic emotion awakens first at the end of infancy when the first child-love occurs. At about the tenth year a new phase begins, that of the second child-love or the first shy love. The

approach of puberty causes timidity in the relations of the two sexes, leading to a period of sexual isolation, when boys and girls try to avoid each other. This timidity is gradually followed by the full youthful love round about eighteen. Then the individual reaches the phase of maturity when he can approach the other sex on terms of equality.

The apparent purpose of this mental, if not sentimental development, is to prevent premature sexual relations and perhaps also to enrich the emotional life. Thus, Dr. Bruhn explained, erotics can aid, but can also prevent sexual life in harmony with the physical needs of the individual.

### *Physiology*

*Science News-Letter, September 18, 1930*

## *Green Germ Killer*

WOUNDS in surgical operations may soon be sewn with bright green catgut affording to patients the greatest possible protection against infection, according to reports to the American Medical Association, from Odessa, where Dr. S. Baccal has been experimenting with powerful antiseptics.

Dr. Baccal covered the lips of a wound with brilliant green, an aniline dyestuff, and the wound remained sterile during a period of seven days after the operation and it was impossible to obtain germ-colonies from samples taken from the wound. Brilliant green kills all bacteria promptly, in smaller amounts and in more dilute solutions than any of the antiseptics known previously. It is not irritating; it can be applied to mucous membranes, it can be even placed in the eye. In the surgical clinic of Odessa it is now exclusively used for washing the surgeon's hands before operations, because it never leads to infections.

Dr. Baccal also found that the saturation of silkworm catgut with alcohol and brilliant green did not make this suture-material less soft, elastic or pliable, and at the same time increased its safety causing no suppuration whatever.

This brilliant stuff has only one defect, it stains the hands of the surgeon a bright green, which cannot be washed away for several days. Dr. Baccal is therefore anxious to find a formula for a bleach, which will remove the color.

### *Chemistry—Medicine*

*Science News-Letter, September 18, 1930*

## *Arlington Bridge*

THE new Arlington Memorial Bridge across the Potomac River at Washington, one of the world's finest examples of stone arch spans, will very probably be ready for use with temporary approaches on the Virginia end, where much filling must be done, for the 1932 bicentennial celebration of the birth of George Washington.

"I expect to have the bridge itself done sometime this autumn, by the end of this working season," Lt. Col. U. S. Grant 3rd, director of public buildings and parks of the capital, recently told a congressional committee. "Then we will be able to haul earth from both banks and make our fill on Columbia Island and the approach on the Virginia shore. We hope to have it available for traffic over unsurfaced roads—that is, the first temporary covering of the fill—by the end of the 1931 working season."

The project of building the bridge and highway approaches in Virginia and widening nearby streets in Washington is now in its fifth year. As adopted by Congress it is to be completed in another five years.

The bridge itself is 1,858 feet long and is composed of eight masonry arches of Stone Mountain granite and a ninth-central double leaf bascule draw span. The spans have a clear width from inside wall to inside wall of from 165 to 180 feet.

### *Engineering*

*Science News-Letter, September 18, 1930*

## *Fatal Sulfur*

SULFUR, the element traditionally associated with things infernal, has a blighting and fatal effect on some of the fungi responsible for plant diseases. But to do its work a particle of the solid sulfur itself must come into contact with the thread-like body of the fungus.

This has been discovered by Dr. William Goodwin of South Eastern Agricultural College, Wye, England, who reported on his experiments to the International Botanical Congress at Cambridge. Dr. Goodwin's work was designed to settle the disputed question whether sulfur volatilizing by heating could also kill fungi; he found that it could not. He also found that the effectiveness of powdered sulfur in washes and sprays is heightened by the presence of an alkali.

### *Botany*

*Science News-Letter, September 18, 1930*

# Why We Have Hurricanes

*Meteorology*

AS TOLD THE NATION BY

Charles L. Mitchell, Chief Forecaster of the U. S. Weather Bureau

FROM out the "doldrums" of the atmosphere where, like in the human state of mind of the same name, decisions are variable without force and permanence, there come the West Indian hurricanes that occasionally cause damage and loss of life in Florida and the Gulf Coast, Mr. Mitchell said.

"You have doubtless experienced a state of mind known as the 'doldrums' when there was a sort of sense of depression with variable decisions that lacked force and permanence," he explained. "There is likewise an area, or belt, called the doldrums, over the Atlantic Ocean north of the Equator, between South America and Africa, that moves northward and southward with the sun and in this belt there is a slight depression of the barometer." During the seasons of the year that this belt of doldrums is quite near the Equator nothing happens except that the winds are light and variable and local thunderstorms of the usual afternoon convectional type are rather frequent. This is true, Mr. Mitchell explains, largely because of the fact that the deflective force of the earth's rotation is necessary in the process of initiating a cyclonic storm, and that force is so near zero on and near the Equator that no such storms can originate there.

## Shifting Doldrums

"In late summer and early autumn," Mr. Mitchell continued, "the eastern end of the Atlantic belt of doldrums is so far north that it is between 10 and 15 degrees away from the Equator. The deflective force of the earth's rotation is quite sufficient to initiate a cyclonic circulation, granting that other conditions are favorable. At the other end of this belt of doldrums, only 6 or 7 degrees away from the Equator, the deflective force is too small, so that such storms do not develop there. High temperature and high

OVER the Columbia net-work of long and short wave radio stations while the recent West Indian hurricane was destroying life and property.

**T**HIS was a Science Service broadcast scheduled two months in advance. The Science News-Letter of August 2 announced that Mr. Mitchell would talk about hurricanes on September 5. Neither the Science News-Letter nor Mr. Mitchell claims to have foreseen the storm, but the editor does ask that you read on this page announcements of radio addresses.

humidity are favorable to, if not essential in, the development and maintenance of a tropical cyclone. Both of these requirements are fully met in the doldrums between the system of northeast trade winds of the northern hemisphere and the

southeast trade winds of the southern hemisphere.

"When the belt of doldrums shifts sufficiently far to the north, which is in the period roughly from the middle of July to the middle of September, the southeast trade winds change their direction due to the deflective force of the earth's rotation, and become southwest winds when more than about five degrees north of the Equator. Between these steady winds blowing from opposite directions is the doldrum area of light variable winds, high temperature, and high humidity—all favorable for the development of local thunderstorms and squalls. At times these conditions increase in frequency and intensity for a few days, and then by some so-called "trigger" action, which is not thoroughly understood, but which requires winds from opposite directions over the ocean areas to the north and to the south of the unsettled region, a cyclonic circulation is somehow set up around a center in the belt of doldrums. After the wind circulation is once started, there is a plentiful supply of energy from the latent heat set free in the process of condensation and precipitation of moisture in connection with the heavy rainfall that always accompanies tropical cyclones, so that the cyclonic circulation is not only maintained but greatly increased, both in lateral and vertical extent."

## RADIO ADDRESSES

### Columbia Chain

**Friday Afternoons, 3:45 P. M., E. S. T.**  
**HEREDITY AND ENVIRONMENT**

—Sept. 19

**Dr. A. F. Blakeslee**, assistant director, Station for Experimental Evolution, Carnegie Institution of Washington

**UNCLE SAM WATCHES HIS ANIMALS** —Sept. 26

**Dr. Paul G. Redington**, director, U. S. Biological Survey

**WHO WAS THE INDIAN?** —Oct. 3

**Rev. John M. Cooper**, professor of anthropology, Catholic University of America

**THE HIGH ATMOSPHERE AND RADIO** —Oct. 10

**Dr. Edward O. Hulbert**, physicist, U. S. Naval Research Laboratory

**EARTHQUAKES IN THE UNITED STATES** —Oct. 17

**Capt. N. H. Heck**, chief of the Division of Terrestrial Magnetism and Seismology, U. S. Coast and Geodetic Survey

**A FUTURE JOURNEY TO THE MOON** —Oct. 24

**Dr. John Q. Stewart**, associate professor of astronomical physics, Princeton University

# Kalmia - Mountain Laurel —A Classic of Science

*Botany*

*TRAVELS INTO NORTH AMERICA; containing its Natural History, and a circumstantial Account of its Plantations and Agriculture in general, with the Civil, Ecclesiastical and Commercial State of the Country, the Manners of the Inhabitants, and several curious and important remarks on various Subjects. By Peter Kalm. Translated into English by John Reinhold Forster. 3 volumes. Warrington: MDCCCLXX (1770).*

NOVEMBER the 20th, 1748.  
The Spoon tree, which never grows to a great height, we saw this day in several places. The Swedes here have called it thus, because the Indians who formerly lived in these provinces, used to make their spoons and trowels of the wood of this tree. In my cabinet of natural curiosities, I have a spoon made of this wood by an Indian, who has killed many stags and other animals on the very spot where Philadelphia afterwards was built; for in his time that spot was yet covered with trees and shrubs. The English call this tree a *Laurel*, because its leaves resemble those of the *Laurocerasus*. Dr. Linnaeus, conformable to the peculiar friendship and goodness which he has always honoured me with, has been pleased to call this tree *Kalmia foliis ovatis, corymbis terminalibus*, or *Kalmia latifolia*. It succeeds best on the side of hills, especially on the north side, where a brook passes by; therefore on meeting with some steep places (on hills) towards a brook, or with a steep side of a hill towards a marsh, you are sure to find the *Kalmia*. But it frequently stands mixed among beech trees. The higher the *Kalmias* stand on the north side of a mountain, the less they grow: I have seen them not only in *Pennsylvania* and *New Jersey*, but even in *New York*, but there they are more scarce: I never found them beyond the forty-second deg. of north lat. though I took ever so great care to look for them: they have the quality of preserving their fine green leaves throughout winter, so that when all other trees have lost their ornaments, and stand quite naked, these cheer the woods with their green foliage. About the month of *May* they begin to flower in these parts, and then their beauty rivals



Photograph by Wild Flower Preservation Society.

A pupil of the great Linnaeus describes a plant of North America which his master had named in his honor.

that of most of the known trees in nature: the flowers are innumerable, and sit in great bunches. Before they open, they have a fine red colour, but as they are expanded, the sun bleaches them, so that some are quite white; many preserve the colour of roses. Their shape is singular, for they resemble a crater of the ancients: their scent however is none of the most agreeable. In some places it was customary to adorn the churches on Christmas Day or New Year's Day with the fine branches of this tree, which are then thick covered with leaves.

But these trees are known for another remarkable quality; their leaves are poison to some animals, and food for others: experience has taught the people that when sheep eat of these leaves, they either die immediately, or fall very sick, and recover with great difficulty. The young and more tender sheep are killed by a small portion, but the elder ones can bear a stronger dose. Yet this food will likewise prove mortal to them, if they

take too much of it: the same noxious effect it shows in regard to calves which eat too much of the leaves: they either die, or do not recover easily. I can remember, that in the autumn of the year 1748, some calves eat of the leaves, but fell very sick, swelled, foamed at the mouth, and could hardly stand; however, they were cured by giving them gunpowder and other medicines: the sheep are most exposed to be tempted by these leaves in winter; for after having been kept in stables, for some months they are greedy of all greens, especially if the snow still lies upon the fields, and therefore the green but poisonous leaves of the *Kalmia* are to them very tempting. Horses, oxen and cows which have eaten them have likewise been very ill after the meal, and though none of them ever died of eating these leaves, yet most people believed that if they took too great a portion of them, death would certainly be the result. For it has been observed that when these animals only eat small quantities, yet they suffer great pains. On the other hand, the leaves of the *Kalmia* are the food of stags, when the snow covers the ground, and hides all other provisions from them. Therefore, if they be shot

in winter, their bowels are found filled with these leaves; and it is very extraordinary that if those bowels are given to dogs, they become quite stupid and as it were drunk, and often fall so sick that they seem to be at the point of death, but the people, who have eaten the venison, have not felt the least indisposition. The leaves of the Kalmia are likewise the winter food of those birds, which the Swedes in North America call Hazel-hens, and which stay here all winter, for when they are killed, their crop is found quite filled with them.

The wood of the *Kalmia* is very hard, and some people, on that account, make the axis of their pulleys of it. Weavers' shuttles are chiefly made of it, and the weavers are of opinion that no wood in this country is better for this purpose, for it is compact, may be made very smooth, and does not easily crack, or burst. The joiners and turners here employ it in making all kinds of work, which requires the best wood; they chiefly use the root because it is quite yellow; the wood has a very suitable hardness and fineness, and from the center, spread as it were small rays, which are at some distance from each other. When the leaves of the *Kal-*

*mia* are thrown into the fire, they make a crackling like salt. The chimney sweepers make brooms in winter of the branches with the leaves on them, since they cannot get others in that season. In the summer of the year 1750, a certain kind of worms devoured the leaves of almost all the trees in Pennsylvania; yet they did not venture to attack the leaves of the Kalmia. Some people asserted that when a fire happened in the woods, it never went further, as soon as it came to the Kalmias, or *Spoon trees*.

#### The Dwarf Laurel

MAY the 28th, 1749. The *Magnolia glauca* was now in full bloom. Its flowers have a very pleasant fragrance, which refreshes the travellers in the woods, especially towards the evening. The flowers of the wild vine afterwards supplied the place of those of the Magnolia. Several other flowers contribute likewise towards perfuming the ambient air.

The *Kalmia angustifolia* was now everywhere in flower. It grows chiefly on sandy heaths, or on dry, poor grounds, which few other plants will agree with; it is common in Pennsylvania, but particularly in New Jersey, and the province of New York, it is

scarce in Canada; its leaves stay in winter; the flowers are a real ornament to the woods; they grow in bunches like crowns, and are of a fine lively purple colour; at the bottom is a circle of deep purple, and within it a greyish or whitish colour. The flowers grow as aforesaid, in bunches, round the extremity of the stalk, and make it look like a decorated pyramid. The English at New York call this plant the *Dwarf Laurel*. Its qualities are the same with those of the *Kalmia latifolia*, viz. that it kills sheep and other lesser animals, when they eat plentifully of it. I do not know whether it is noxious to the greater cattle. It is not of any known use, and only serves to attract the eye whilst in flower.

The *Kalmia latifolia* was likewise in full bloom at present. It rivals the preceding one, in the beauty of its colour; yet though they are conspicuous in regard to the colours and shape of their flowers, they are no ways remarkable for smell, such as the *Magnolia* is; for they have little or no smell at all. So equally and justly does nature distribute her gifts; no part of the creation has them all, each has its own, and none is absolutely without a share of them.

Science News-Letter, September 13, 1930

## Country's Dialects Recorded For Study

*Philology*

THE dry New England manner of speech, the southern drawl, Pennsylvania Dutch rising inflections, the Western twang—we pick them out by ear as we hear Americans talk. But now, two professors at Columbia University are collecting American dialects and making a careful scientific analysis of subtle differences. The New Englander of the sea, for example, has a different way of using tongue and lips in his speech from the New Englander of the hills.

More than 200 phonograph records, including 50 speeches by famous people, have been collected by Prof. Harry M. Ayres and Prof. W. Cabell Greet. Their library contains what would appear to be a strange collection of literature, 150 copies of the same story, "Grip the Rat," but every copy of the story is spoken by a different American voice. They have been aided in collecting varieties of American speech by the fact that the 14,000 summer school students at the university have a convenient custom

of gathering beneath trees named for their states. Here, on the campus, can be picked out and sorted plenty of dialects, pure and mixed.

In a progress report to the journal, *American Speech*, the two professors point out that education does not completely eradicate local speech peculiarities. Students reproduce local traits to a surprising degree, they have found. The terror of the microphone proves an aid in scaring artificial mannerisms out of most students who have added their voices to the collections.

The report goes into detail regarding differences in specific vowels and consonants in various parts of the United States and Canada. The typical New Englander of the coast speaks with a sharp attack and brisk utterance. The vowel a, which is one of the letters that has a vivid and changeable personality on the American tongue, is most typically New England in asked, aunt, and can't where the tone is placed far front. In barn, the a is located slightly

further back, and the professors explain that in no case is this sound as far back as in the ordinary American pronunciation of father.

The mountain New Englander has "a slow elegaic cast in his speech tone, a certain doubt as to the advisability of proceeding, coupled with a resigned acceptance of the necessity of doing so," the report graphically explains. The a sound in this region is shorter than in the speech of the sea coast.

This example of contrast indicates the analytic method of the study, which goes into much detail and uses many technical terms such as fronting, cupping, and vowel gliding, to describe the sounds Americans make when they talk.

Records of the various speech types of a single community, Williamsburg, Virginia, were this summer gathered under the direction of Prof. Greet and should yield interesting results, Prof. Ayres stated.

Science News-Letter, September 13, 1930

## Male Toads Become Mothers

Zoology

**T**OADS have won the distinction of being the first males to give birth to an offspring. Several male toads were changed to perfectly good wives and mothers by Dr. Kitty Ponse, professor of experimental zoology at the University of Geneva, and when she reported her results to the Second International Congress for Sex Research in London, they created a considerable stir in biological circles.

The surgical removal of the sex glands of full-grown male toads was followed by the gradual enlargement of a tiny, hardly noticeable piece of tissue, called the organ of Bidder. This newly formed large organ upon closer examination turned out to be a female sex gland, an ovary, containing normal looking, mature eggs ready to be fertilized.

These ex-males mated willingly with real masculine toads and surprised scientists by their extreme partiality to their former sex in producing a progeny exclusively of males. Out of the 400 male-begotten and feminized male-conceived baby toads every single one turned out to be a male, presumably because of a peculiar organization of the eggs produced by the sexually changed animals.

In this connection it may be re-

called that an American scientist, Dr. A. V. Domm of the University of Chicago, accomplished another, equally remarkable feat, by changing the sex of birds into the exactly opposite direction. He removed in 175 young female chickens the left ovary, this being the fowls' only ovary; for the right one is always degenerated and atrophic. This small, degenerated nodule, however, very much like the organ of Bidder in toads, developed into a full-sized sex gland, but not to an ovary, as one might have supposed, but to the gland of the opposite sex, to a testicle. This newly formed male sex gland produced sperm, thus making the hens potential fathers.

Sex reversals caused by a loss of the sex gland occur also in nature. When male salamanders starve for many months their male sex gland occasionally degenerates completely, and upon finding food again they develop new sex glands in the place of the old, but the new glands are those of the opposite sex. And it happens that hens, too, lose their ovary, not by operation, but by disease. If tuberculosis should destroy their ovary, the effect is the same as after spaying; the small right nodule begins to grow and develops into a male sex gland.

Science News-Letter, September 13, 1930

## Indians Make Birch Bark Maps

Geography

**L**ABRADOR, which still ranks more or less as unknown country on the white man's map of the world, has been very thoroughly "discovered" and even partly mapped by the Indians who live on the peninsula. This enterprise of adventurous Indian explorers has been found out by Dr. Frank Speck, anthropologist of the University of Pennsylvania, who has just completed his survey of the Indian bands that live on the Labrador peninsula.

"It develops that there is no part of the region untracked or unknown to the nomadic bands, and that they even make maps upon birch-bark of its lakes and river systems," Dr. Speck stated.

The region, which takes in about one-twelfth of North America's territory, is one of the most sparsely inhabited parts of the world. Besides

the Eskimos along the coast, and several thousand white inhabitants, there are about 3,000 Indian natives in the entire area, Dr. Speck found. The anthropologist obtained first hand information from many of the scattered Indian bands, questioning them about their social organization, the extent of their boundaries, and their Indian names and the meanings.

Dr. Speck's survey, which has been going on for some years, shows that the Indians cannot properly be considered as belonging to two tribal groups, as they have heretofore been classified. The Indians live rather in bands composed of related families that hunt in the same section year after year and go to the same trading posts each summer to barter their fur catch. There are twenty-six bands in the area, he found.

Science News-Letter, September 13, 1930

## Kewaunee Laboratory Furniture Saves Time

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## Rise and Fall of Incas—Continued

were wizards and masters of abomination."

Dr. Bingham finds sufficient evidence to warrant the belief that Machu Picchu was the place the missionary wished to see, but which remained unreported by white men until long after the last refugees died and left their homes to the swiftly growing jungle.

There are traces of strange events in the ruins and graves that represent the later period of Machu Picchu's occupation. The builders who put the old city in shape for its last set of residents were under pressure of speed, Dr. Bingham points out. Above the solid ancient foundations they laid hasty walls, and in order to provide enough houses they even built some on the old agricultural terraces.

The people whose coming was so swiftly prepared for were mostly women. In the burial caves which contained pottery of late Incan types most of the skeletons were those of women. There were a few children, a few bones pronounced those of effeminate men, of "inferior physical development." In graves within twenty-five miles of the mountain there were found the skeletons of fighters who were sturdy of build and who bore marks of battle and surgical operation. But the high citadel itself stood aloof from warfare. In all the hundred burial caves found on the sides of the mountain and on the neighboring peak of Huayna Picchu, there was no sign of broken or patched skulls, or of any husky soldiery to protect the women of the sacred city.

### Women's Pottery

The pottery in the graves was all of the type associated with Incan women. There were ladies such as were used in drinking the favorite soups and stews of the highlands. There were sets of cooking jars and dishes and large pins of bronze which the women used to fasten their shoulder coverings.

The most wealthy woman of all, judging by her burial display, was a delicately formed little person, a "grande dame" of the Incan nobility. Her property placed in her burial cave included a set of clay dishes, a bronze mirror, bronze pins and spoons. With her lay the skeleton of her dog, an Incan collie.

One puzzling discovery was the burial of two men accompanied by women's possessions. Not only was

there a jug of the sort belonging to women in the grave of the older man, but there were also bronze necklace pendants, and some ornaments. The younger of the two men had an elaborately carved gray talc necklace ornament, a number of bone beads, and, strangest of all, some greenish fragments which appeared to be the remains of a bead made of fused green glass. These two burials were among the latest in the sacred city, for muscles of one thigh still adhered to the bone of the older man, and there were a few pieces of cloth and cord made from brown llama wool.

### Who Were They?

There was something peculiar about these two, Dr. Bingham reasons: "Were they unwelcome visitors who came to the outskirts of the sacred city and were buried near the gate without being admitted to the society of the Virgins of the Sun? It seems to be an insoluble puzzle. And what about that bead of fused green glass? Where did the young man get that? It is probably of European origin. To be sure, it is only a little thing, but it would seem to say that the young man came here after the Spaniards had reached Cuzco. Were these men spies, sent by the Spaniards to try and locate the refuge of the Virgins of the Sun who had escaped from the holy city? Did they bring presents for the sacred women, necklaces and a jug and a precious glass bead, the like of which none of them had ever seen before? Who can tell?"

*Science News-Letter, September 13, 1930*

### New Canning Aid

ACETALDEHYDE vapor may have a future use in the preservation of fruit because it kills the spores of molds without injuring the fruit itself.

This conclusion has been reached by two investigators who have worked on different sides of the question. R. G. Tompkins, of the Low Temperature Station, Cambridge, England, has shown that acetaldehyde vapor rapidly kills the spores of the molds and fungi which are likely to cause fruit spoilage.

In the same laboratory, S. A. Trout has recently found that healthy fruits can absorb a certain amount of acetaldehyde vapor without any harmful effects.

*Botany*

*Science News-Letter, September 13, 1930*



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**NATURE RAMBLINGS**

By Frank Thone

**Talented Hind Legs**

Among the ground-dwelling quadrupeds the universal tendency is for the hind legs to become longer and stronger than the front ones. Even among those that remain permanently four-footed this evolutionary drift can be noted: horses and cows, dogs and cats, rats and rabbits are all witnesses.

In some cases, of which man is the most familiar and conspicuous, this tendency ends in complete bipedalism. The hind limbs assume all the work of supporting and moving the body, leaving the front ones to become arms, with hands at the end to do all sorts of things both good and ill.

But man is not the most highly specialized biped in this existence. His legs are after all fairly conservative affairs, that stick to running, walking and such-like sober gaits. A man who can jump twice his own length is doing pretty well; if he can jump three times his own length he is quite definitely athletic. But there are plenty of mammals whose hind limbs have become so specialized for jumping that three or four times their own length even including a longish tail) is a commonplace amble. The numerous species of kangaroos in Australia and the neighboring islands are classic examples, and even more striking are the so-called kangaroo rats and kangaroo mice, and the similar-appearing but more distantly related jerboas. Some of these little jumpers can make leaps of three or four feet quite easily, and more than that if they are frightened badly enough, although their body length may be only three or four inches.

There are some birds, too, that can do surprising feats in jumping.

Zoology

Science News-Letter, September 13, 1930

**Squatty Steel Tank**

If you fill a rubber balloon with water, put the inside under about 15 pounds pressure and set it down on a table, it will assume a shape very much like that of the huge metal tank shown on the front cover. In fact, that is the very reason this tank was built as a bulging spheroid.

For the same amount of steel, a tank made in this odd shape will hold more liquid than one of the usual cylindrical design. As much material as possible is used for a direct purpose and as little as possible merely to maintain shape. The bottom, shell and roof form a more or less continuous curve and much of the bursting force is transferred from the sides to the roof and bottom so that practically all the metal is used for effective stress purposes.

Natural gasoline, high test and even some ordinary motor fuel gasolines boil at ordinary temperatures and the loss from this boiling is excessive unless the liquid can be subjected to a slight pressure.

The spheroid is built to withstand effectively the combination of gas and liquid pressures. As the gas

pressure is increased the structure tends to become more spherical and as it is filled with liquid, it tends to flatten out. The only place where the tendency to change shape is sufficient to require reinforcing is near the bottom and here supports take care of the overhanging liquid load.

Science News-Letter, September 13, 1930

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## FIRST GLANCES AT NEW BOOKS

**THE SECOND INDUSTRIAL REVOLUTION AND ITS SIGNIFICANCE**—Percy S. Brown and others—*American Academy of Political and Social Science*, 224 p., \$2.00. The authors of the papers in this volume have tried not only to describe the subject but also to anticipate what the results of the second industrial revolution may be and to point out how the less fortunate of these results may be avoided or mitigated. Reviews of pertinent books conclude the volume.

*Economics*

*Science News-Letter, September 18, 1930*

**THE ORIGIN OF OUR DOMESTIC ANIMALS**—E. Alfred Wolf—*Univ. of Pittsburgh*, 56 p., 50 cents. A collection of the University of Pittsburgh radio talks telling where we got horses, cattle, sheep, goats, swine, dogs and cats, and what influence domestic animals have had in the historical development of mankind.

*Zoology*

*Science News-Letter, September 18, 1930*

**SPICES AND CONDIMENTS**—James B. McNair—*Field Museum Press*, 64 p., 25c. For spices Columbus sailed and caravans set forth in ancient days upon adventurous journeys. Whence come strange and familiar stimulants to jaded appetites and what they are botanically is explained in this booklet.

*Botany*

*Science News-Letter, September 18, 1930*

**AN ECONOMIC STUDY OF FOOD BY FARM AND VILLAGE FAMILIES IN CENTRAL NEW YORK**—Faith M. Williams and Julia E. Lockwood—*Cornell University Agricultural Experiment Station*, 52 p. Housewives and dietitians who have struggled to keep in proper ratio the pennies and the calories will be interested in this physiological study in nutrition. In the area studied, the retail value of adequate low cost food for a man at moderate work requiring 3400 calories a day is 49.4 cents.

*Sociology—Nutrition*

*Science News-Letter, September 18, 1930*

**REVISION OF THE FISHES OF THE FAMILY LIPARIDAE**—Victor Burke—*Govt. Printing Office*, 204 p., 45c. Of interest to systematic zoologists.

*Ichthyology*

*Science News-Letter, September 18, 1930*

**PERSONAL AND COMMUNITY HEALTH**—Clair E. Turner—*Mosby*, 443 p., \$2.75. The third edition of this popular textbook has been thoroughly revised and an entire chapter on health maintenance has been added. This new section contains not a hygienic program of living, but rather information concerning the health hazards jeopardizing adult life. The author gives a brief résumé of the present status of our information on the diseases of the heart, blood vessels and kidneys, cancer, diabetes and endocrine disorders. The separation of diabetes from endocrine disorders can only be justified from a didactic point of view. The appended bibliography contains valuable suggestions for further study.

*Public Health—Hygiene*

*Science News-Letter, September 18, 1930*

**THE NEW SOCIAL SCIENCE**—Edited by Leonard D. White—*University of Chicago Press*, 132 p., \$1.50. The occasion of the dedication of the University of Chicago's new Social Science Research Building provided the opportunity for an evaluation of the complex ramifications of the widespread claims of the social sciences as now staked out. But this printing of the addresses delivered upon that occasion is more than the souvenir of a historical event; the discussions provide for social scientist, researcher in other fields and layman alike a survey of the aspirations and possibilities of this sector of science which comes into intimate contact with massed humanity.

*Social Science*

*Science News-Letter, September 18, 1930*

**PROSPERITY RESERVES OF PUBLIC WORKS**—Vernon Arthur Mund—*American Academy of Political and Social Science*, 49 p., \$2.00. A review of the theory of stabilizing industry and relieving unemployment by deferring public work until periods of general business depression. The author not only reviews the history but comments on the present practical applications and makes concrete suggestions for improving them. Otto T. Mallery, of the U. S. Department of Commerce, called this study an important contribution to the subject.

*Economics*

*Science News-Letter, September 18, 1930*

**STORIES POSTAGE STAMPS TELL**—Sigmund I. Rothschild—*Putnam's*, 158 p., \$3.50. Postage stamps of the world form an international picture gallery in which there may be found in addition to portraits of reigning sovereigns and deceased presidents, pictures of birds, animals, racial types, flowers, ships, airplanes, engineering structures and archaeological ruins. The author has brought together in illustration and description outstanding examples of the variety of stories that postage stamps tell.

*Philately*

*Science News-Letter, September 18, 1930*

**A STUDY OF THE PHYTOSAURS**—C. L. Camp—*Univ. of California Press*, 174 p., 6 pl., \$3.50. A monograph on an interesting saurian group, in which the author has added results of his own researches to a summing up of the material already known. It will be welcomed by paleontologists.

*Paleontology*

*Science News-Letter, September 18, 1930*

**A BIBLIOGRAPHY OF THE TUNAS**—Genevieve Corwin—*California State Printing Office*, 104 p. Ichthyologists will be glad to see this addition to their literature, which will make more available many scattered works on this interesting and important group of fishes.

*Ichthyology*

*Science News-Letter, September 18, 1930*

**HISTORY OF BIOLOGICAL THEORIES**—Emanuel Rádl, transl. by E. J. Hatfield—*Oxford Press*, 408 p., \$6. A number of books which have appeared in this general field undertake to hold the attitude of coolly impartial historical accounts. This, the present author does not attempt to do; his book is frankly a critical essay in which he gives play to his own opinions. With due allowance for this fact, it will be found a useful addition to the shelves of the mature-minded biologist.

*History of Biology*

*Science News-Letter, September 18, 1930*

**THE RADIO AMATEUR'S HANDBOOK**—A. Frederick Collins—*Crowell*, 367 p., \$2. A revised edition into which is incorporated the progress that the radio industry has made during the past two years.

*Radio*

*Science News-Letter, September 18, 1930*